REMARKS

Applicant has amended claims 1 and 16 to clarify nonobvious features of the claimed method of controlling ethanol production and mass production of lactic acid and transformant therefor. These amendments are supported by paragraph [0063] of the as-filed specification. Applicant has amended the dependent claims to delete minor informalities. No new matter has been introduced.

Applicant respectfully traverses the 35 U.S.C. § 103(a) rejection of claims 1-7 and 16-18 over WO 99/14335 to Porro et al. ("Porro").

To establish a *prima facie* case of obviousness, three basic criteria must be met. M.P.E.P § 2143, 8th Ed., Rev 7 (July 2008). First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. M.P.E.P § 2143; *see also In re Rouffet,* 149 F.3d 1350, 1357 (Fed. Cir. 1998). Although the Supreme Court cautioned against an overly rigid application of "teaching, suggestion, or motivation" (TSM) approach, the Court nevertheless recognized that use of a teaching/suggestion/motivation approach to the question of obviousness "captured a helpful insight." *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1739 (2007); *Id.* at 1741 (citing *In re Bergel* , 292 F.2d 955, 956-57(1961)). In its subsequently-published examination guidelines, the PTO stated that the TSM approach remains a valid rationale for determining obviousness. *See* M.P.E.P. § 2141(III). Second, there must be a reasonable expectation of success. M.P.E.P § 2143.02.

Third, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. M.P.E.P § 2143.

Amended claim 1 recites, among other things, "a foreign protein having lactate dehydrogenase activity and pyruvic acid substrate affinity that equals or exceeds the pyruvic acid substrate affinity of the pyruvate decarboxylase inherent in the host organism, wherein a single copy of the DNA for coding the aforementioned foreign protein has been incorporated . . . wherein the pyruvate decarboxylase gene on the host chromosome is replaced with the single copy of the DNA for coding the foreign protein having lactate dehydrogenase activity." Amended claim 16 also recites, among other things, "a single copy of the DNA for coding a bovine-derived lactate dehydrogenase or its homologue has been incorporated . . . wherein the pyruvate decarboxylase 1 gene on the host chromosome has been replaced with the single copy of the DNA for coding a bovine-derived lactate dehydrogenase or its homologue."

Porro does not disclose or suggest at least the above features of amended claims 1 and 16. In contrast, Porro teaches that the recombinant yeast examined in Tables B and 6 were produced by electroporation with exogenous 2 μm plasmids encoding a foreign lactate dehydrogenase gene. *See*, *e.g.*, page 13, line 10-page 14, line 15; page 30, line. 7-p. 31, line 15; and p. 41, line 25-page 44, line 8 of Porro. Since electroporated cells generally contain 30-50 copies of exogenous 2 μm plasmids (*see*, *e.g.*, Sambrook et al., Molecular Cloning: A Laboratory Manual, 2nd ed., at Chapter 16, and Ausubel et al., Current Protocols in Molecular Biology, Vol. 2, at Chapter 13), the yeast disclosed in Porro likely contain multiple copies of DNA for coding the foreign

lactate dehydrogenase gene. *See also* pages 4-5 of Reply to Office Action of December 29, 2008.

Moreover, *Porro* teaches that the recombinant yeast disclosed therein produce 43.1 g of lactic acid per liter of culture solution after 92 hours of fermentation and 109 g of lactic acid per liter of culture solution after 137 hours of fermentation. *See Porro* at Tables B and 6 on pages 52 and 61, respectively.

In contrast, the claimed transformant containing only a single integrated copy of the foreign lactate dehydrogenase gene was capable of producing 45.0 to 50.0 g of lactic acid per liter of culture solution after 120 hours of fermentation. *See* specification at [0063]. Thus, the claimed transformant, with incorporation of only a single intergrated copy of a lactate dehydrogenase gene, produces quantities of lactic acid similar to those produced by the yeast disclosed in Porro, which contains multiple copies of lactate dehydrogenase genes. Based on the teachings of Porro, one skilled in the art would not have reasonably predicted the increased efficiency of lactic acid production by the claimed transformants recited in the claims.

Since Porro fails to disclose or suggest all of the features of claims 1 and 16, and the results of the claimed transformants were not predictable from the prior art, claims 1 and 16 are not obvious over Porro. Claims 2-7 and 17-18 are allowable over Porro at least for the same reasons as independent claims 1 and 16.

In view of the foregoing amendments and remarks, Applicant respectfully requests reconsideration of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: June 15, 2009

By: _____
James W. Edmondson
Reg. No. 33,871
(202) 408-4100